

**Claim Rejections - 35 U.S.C. § 102(b) & §103(a)**

Claims 1-28 have been rejected under 35 U.S.C. § 102(b) as being anticipated by, or, in the alternative, under 35 U.S.C. §103(a) as being obvious over U. S. Patent No. 5,454,842 to Poirier (hereinafter the "Poirer reference"). As the Poirier reference neither teaches nor suggests a nitrated C<sub>1</sub>-C<sub>4</sub> ester or triglyceride of a fatty acid having at least one nitrate group attached to at least one secondary carbon of the ester or triglyceride, Applicants traverse the rejection.

There are four new independent claims in the present application. Independent claim 29 recites a cetane improver, the improver comprising a nitrated C<sub>1</sub>-C<sub>4</sub> ester of a fatty acid, wherein the ester is derived from a naturally occurring triglyceride and at least one nitrate group attached to at least one secondary carbon of the ester. Independent Claim 37 recites a cetane improver, the improver comprising a nitrated triglyceride of a fatty acid, wherein the ester is derived from a naturally occurring triglyceride and at least one nitrate group attached to at least one secondary carbon of the triglyceride. Independent claim 46 recites a method of improving the properties of diesel fuel comprising preparing a nitrated C<sub>1</sub>-C<sub>4</sub> ester of a fatty acid, wherein the ester is derived from a naturally occurring triglyceride and at least one nitrate group attached to at least one secondary carbon of the ester and adding the nitrated ester to diesel fuel. Independent Claim 52 recites a method of improving the properties of diesel fuel comprising preparing a nitrated triglyceride of a fatty acid, wherein the ester is derived from a naturally occurring triglyceride and at least one nitrate group attached to at least one secondary carbon of the triglyceride and adding the nitrated triglyceride to diesel fuel.

The specification of the present application discloses that C=C functional groups are targeted for nitration. (See Specification Page 5, last paragraph; page 6, first paragraph; page 7, last paragraph; page 8, first paragraph.) **Attached hereto, is a Declaration Under 37 C.F.R. § 1.132 of William R. Sutterlin**, a Process Chemist with Chem Char in Columbia, Missouri and a PhD candidate at the University of Missouri-Columbia, stating the advantages of the present invention in targeting the C=C functional groups of fats and oils include the formation of at least one nitrate group on at least one secondary carbon of a C<sub>1</sub>-C<sub>4</sub> ester or triglyceride of a fatty acid. A C<sub>1</sub>-C<sub>4</sub> ester or triglyceride of a fatty acid having at least one nitrate group on at least one secondary carbon has improved cetane, solubility, detergency and lubricity.

The Poirier reference neither teaches nor suggests a nitrated C<sub>1</sub>-C<sub>4</sub> ester of a fatty acid with at least one nitrate group attached to at least one secondary carbon of the ester or triglyceride of a fatty acid with at least one nitrate group attached to at least one secondary carbon of the triglyceride. Rather, the Poirier reference teaches fatty alcohol nitrate esters having nitrate groups attached to the primary carbons of the fatty alcohol nitrate esters, not the secondary carbons. (See Column 4, lines 40-50.) The fatty alcohol nitrate esters of the Poirier reference with nitrate groups attached to a primary carbon are long chain nitrates with limited effectiveness as cetane improvers and poor solubility. As the Poirier reference neither teaches nor suggests a nitrated C<sub>1</sub>-C<sub>4</sub> ester or triglyceride of a fatty acid having at least one nitrate group attached to at least one secondary carbon of the ester or triglyceride, it is requested that the §102(b) and the §103(a) rejections be withdrawn.

Claims 29-56 are believed to be novel and non-obvious in view of the prior art. Applicants submit that the application as Amended is in condition for allowance and requests

that a timely notice of allowance be issued for this case. Should any unresolved issues remain in this case, please feel free to contact the undersigned at the telephone number listed below.

Respectfully submitted,

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Attachments

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**VERSION WITH MARKINGS TO SHOW CHANGES MADE**

**In the Claims:**

Claims 1-28 have been canceled. The following claims 29-56 have been added.

29. A cetane improver, the improver comprising:

a nitrated C<sub>1</sub>-C<sub>4</sub> ester of a fatty acid, wherein the ester is derived from a naturally occurring triglyceride; and

at least one nitrate group attached to at least one secondary carbon of the ester.

30. The cetane improver of claim 29, wherein the nitration is accomplished by direct nitration.

31. The cetane improver of claim 29, wherein the nitration is accomplished by methoxylation of at least one double bond of the fatty acid and subsequent nitration of the secondary alcohols.

32. The cetane improver of claim 29, wherein the nitration is accomplished by hydration of at least one double bond of the fatty acid and subsequent nitration of the secondary alcohols.

33. The cetane improver of claim 29, wherein the ester is formed by a process including the hydrolysis of vegetable oil followed by esterification of fatty acids formed by the hydrolysis.

34. The cetane improver of claim 29, wherein the ester is formed by the transesterification of vegetable oil.

35. The cetane improver of claim 29, wherein the cetane improver is an additive for diesel fuel.

36. A composition comprising:

the cetane improver of claim 1; and

diesel fuel.

37. A cetane improver, the improver comprising:

a nitrated triglyceride, the nitrated triglyceride being derived from a naturally occurring triglyceride; and

at least one nitrate group attached to at least one secondary carbon of the nitrated triglyceride.

38. The cetane improver of claim 37, wherein the nitration is accomplished by direct nitration.

39. The cetane improver of claim 37, wherein the nitration is accomplished by methoxylation of at least one double bond of the fatty acid and subsequent nitration of the secondary alcohols.

40. The cetane improver of claim 37, wherein the nitration is accomplished by hydration of at least one double bond of the fatty acid and subsequent nitration of the secondary alcohols.

41. The cetane improver of claim 37, wherein the ester is formed by a process including the hydrolysis of vegetable oil followed by esterification of fatty acids formed by the hydrolysis.

42. The cetane improver of claim 37, wherein the ester is formed by the transesterification of vegetable oil.

43. The cetane improver of claim 37, wherein the cetane improver is an additive for diesel fuel.

44. The additive of claim 43, providing more than 90% of the cetane enhancement and 50% of the lubricity enhancement of the diesel fuel.

45. A composition comprising:  
the cetane improver of claim 37; and  
diesel fuel.

46. Method of improving the properties of diesel fuel comprising:  
preparing a nitrated C<sub>1</sub>-C<sub>4</sub> ester of a fatty acid, wherein the ester is derived from a  
naturally occurring triglyceride, and wherein at least one nitrate group is attached to at  
least one secondary carbon of the ester; and  
adding the nitrated ester to the diesel fuel.

47. The method of claim 46, wherein the cetane of the diesel fuel is improved.

48. The method of claim 46, wherein the cetane of the diesel fuel is improved  
more than 90%.

49. The method of claim 46, wherein the lubricity of the diesel fuel is  
improved.

50. The method of claim 46, wherein the lubricity of the diesel fuel is  
improved by at least 50%.

51. The method of claim 46, wherein the detergency of the diesel fuel is  
improved.

52. Method of improving the properties of diesel fuel comprising:  
preparing a nitrated triglyceride, the nitrated triglyceride being derived from a  
naturally occurring triglyceride, and wherein at least one nitrate group attached to at least  
one secondary carbon of the nitrated triglyceride; and

\_\_\_\_\_ adding the nitrated triglyceride to the diesel fuel.

\_\_\_\_\_ 53. The method of claim 52, wherein the cetane of the diesel fuel is improved.

\_\_\_\_\_ 54. The method of claim 52, wherein the cetane of the diesel fuel is improved  
more than 90%.

\_\_\_\_\_ 55. The method of claim 52, wherein the lubricity of the diesel fuel is  
improved.

\_\_\_\_\_ 56. The method of claim 52, wherein the detergency of the diesel fuel is  
improved.